NGC 2440 Milky Way Nebula

Keck Interferometer

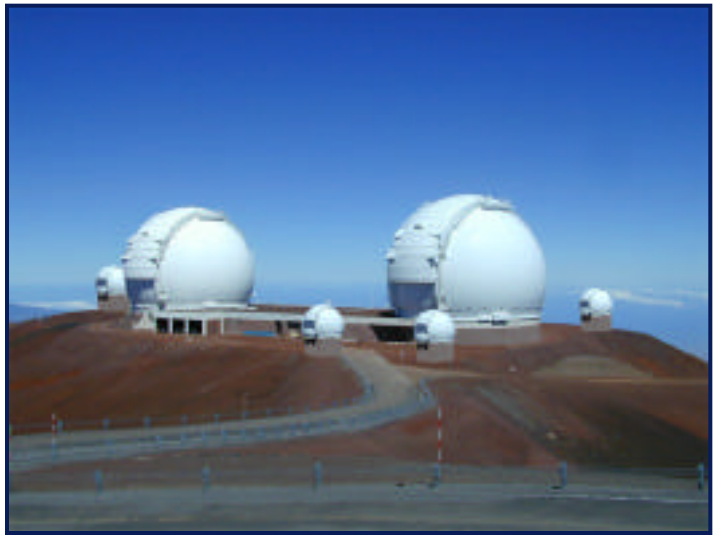
Presented by

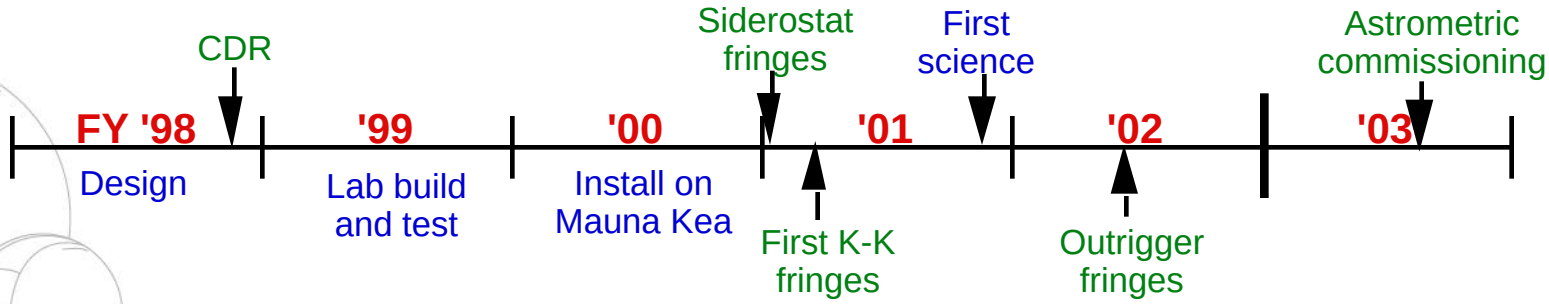
Paul Swanson

Project Manager

Science Goals

- Keck Interferometer Science Goals
  - Characterization of exo-zodiacal dust
    - Uses two Kecks in nulling mode
    - Necessary for Terrestrial Planet Finder
  - Direct detection of hot-Jupiters and brown dwarfs
    - Uses two Kecks in differential-phase mode
  - Astrometric detection of planets
    - Uses four outriggers
  - Broad range of imaging science including protoplanetary disks, YSOs and AGN cores
    - Uses all six telescopes





KECK Interferometer
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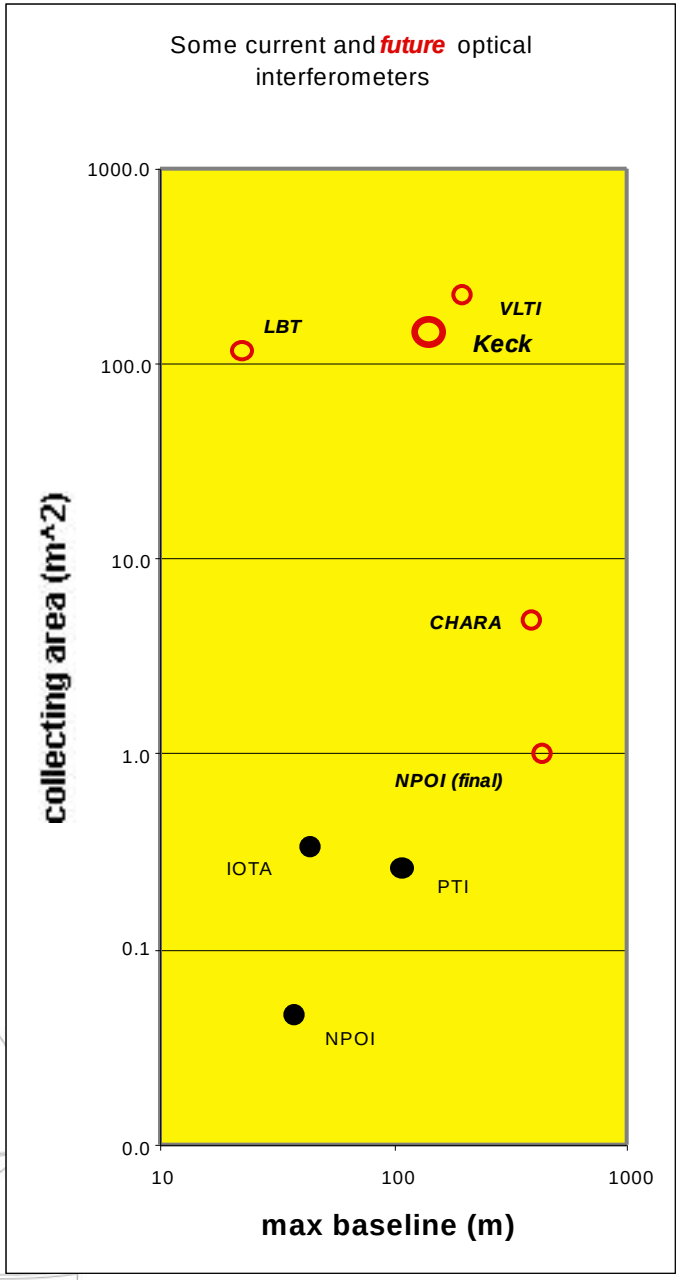
Interferometer Comparisons and Performance



Keck Performance

- Imaging (aperture synthesis) angular resolution
  - @ λ=10 microns - 15 milliarcseconds
  - @ λ= 2 microns - 3 milliarcseconds
- Differential astrometry angular accuracy
  - 30 micro arcseconds
- Sensitivity
  - 21 mag @ 2.2 μm in 1000 seconds
  - 10 mag @ 10 μm in 1000 seconds

LBT = Large Binocular Telescope
Keck = Keck Interferometer
VLTI = Very Large Telescope Interferometer
CHARA = Center for High Angular Resolution Astronomy
PTI= Palomar Testbed Interferometer
IOTA = Infrared-optical Telescope Array
NPOI= Navy Prototype Optical Interferometer

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Science Operations

- Observing mode will be queue service observing
- Formal observing to start in 2004
- Initial observing will be “Shared Risk” Science
  - Early science operations will aid system debugging
  - Selected by peer review (Jan ‘01 NRA release)
    - General V^2 (visibility) science
    - Exo-zodiacal measurement (nulling, 2002)
    - Direct detection of “Hot Jupiters” (differential phase, 2003)
    - Search for Uranus-mass planets by astrometry (outriggers, 2004)
- Interferometer Science Data Center (ISDC)
  - Joint Science data center with SIM
  - Data processing and archiving
  - Needed in 2001 for end-to-end system tests
- Guest Investigator program will gradually replace Key Science program (>2003)

Accomplishments Last Year –

Science and Management

- Text for Key Science NRA submitted to NASA Hq
- Peer Reviews of Science Data Center 8/17/99 and 9/3/99
- Completed draft Transition Plan and Handover Plan 11/99
- Yearly Project replanning and costing
  - Cost/management review 1/31/00
  - Cost issues presented later under Budget
- Papers and publications
  - Five refereed publications in 1999
  - Three papers at SPIE Astronomical Telescopes and Instrumentation (March 2000)
  - Thirteen papers presented at the AAS Winter meeting(1/00)
  - Five papers at “Working on the Fringe,” Dana Pt., CA, May 1999 (ASP Conf. Proceedings 194)

Accomplishments Last Year –

Optics & Instrument

- Siderostat site work completed – Ground-breaking 4/99
- Siderostats installed on summit
- EOS selected as outrigger dome contractor. Fixed-price contract signed for $2 M, 9/99
- Verified end-to-end Fringe Tracker signal chain using final detector array at cryogenic temperatures 1/00
- Keck Observatory basement beam-combining lab
  - 20 optical benches installed
  - Cable tray installation complete
  - The room-in-rooms is complete
  - Electrical power installation is complete
  - Cryo system and autofill electronics installed
  - The FDL and LDL rail installation complete
  - The basement lab area has been cleaned and floor repainted
- Nuller achieved a stabilized null of 10,000:1 with 18% BW

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Outreach

- Completed the Keck Interferometer general audience fact sheet (5/99)
- Completed the "Wave Behavior" curriculum supplement for the Technology Teacher magazine (10/99)
- Revised the KI web page (9/99)
- Completed the Keck Interferometer technical fact sheet (12/99)
- Completed the KI sticker/decal (3/00)
- Drafted the Keck general audience brochure (1/00)
- Started negotiations with CARA on educational outreach in Hawaii

Interferometer

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For more information about the Keck Interferometer,
visit our web site:

http://huey.jpl.nasa.gov/keck/

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